

Thank you . . .

. . . for your interest in C-E-I-R. The literature you requested is attached. The C-E-I-R Center serving your area can give you further information. Please contact:

Mr. Malbon H. Jennings  
Vice President  
C-E-I-R, INC.  
1180 Avenue of the Americas  
New York, New York 10036  
Telephone: JU 2-6640

I-R INC C-E-I-R INC C-E-




INSTITUTE FOR ADVANCED TECHNOLOGY

WINTER CATALOG

1964-1965

**TECHNICAL** is an international applied research and data processing corporation that offers analytical, scientific and computer services to business, science and government. Founded in 1954, it is today the world's largest, most experienced and best equipped independent organization in its field. The C-E-I-R professional staff includes several hundred mathematicians, statisticians, economists, operations researchers, management scientists and others from a variety of disciplines. In addition, scores of the finest scientific and professional brains in America are retained on a consultant basis. Augmenting this professional capability are the most modern electronic computing equipment in use today, and skilled computer programmers and operations personnel at computing centers in five major U.S. cities, London and Mexico City.

 is the latest expression of C-E-I-R's long-standing involvement in the educational challenges associated with the new management techniques and scientific tools introduced with the electronic computer. The revolutionary nature of computer-based methods made education an integral part of C-E-I-R operations from the beginning. This relationship is formalized through the Institute for Advanced Technology. IAT faculty members are drawn primarily from the ranks of C-E-I-R's professional and computer operations staffs. Its curriculum is drawn from subjects in which C-E-I-R staff members are expert — recognized for excellence in day-to-day application of the art and science of computer usage to the real problems of C-E-I-R customers in business and industry. Sharing these new skills — through seminars in major cities, management clinics, and special, in-plant training programs — is the major goal of the Institute for Advanced Technology.



**C-E-I-R President H. W. Robinson**

"Education is required of anyone who would grasp the full scope of what can be accomplished by the powerful combination of intellect and the amplifiers of intellect. Likewise, it is required for those who must understand how to apply this combination to their own fields.

"The heart of this problem is to educate top and middle management in the new technology so that they can use the tremendous resources now available to the greatest advantage in solving their practical problems. They must be educated to exploit these new concepts rather than fear them; to understand the exciting new horizons opened up by the new technology in almost every aspect of their management life."



Scheduled Seminars

## Chronological Schedule

MO.	DATE	SUBJECT	PLACE
November	24, 25	Linear Programming	Wash., D. C.
	30	Power Systems	Wash., D. C.
December	1, 2, 3	Power Systems	Wash., D. C.
	8, 9, 10	PERT, CPM, PERT/Cost	Los Angeles
	8, 9	Linear Programming	Philadelphia
	15, 16, 17	PERT, CPM, PERT/Cost	Wash., D. C.
	15, 16	Resource Allocation	Los Angeles
January	12, 13	Time Series Analysis	Wash., D. C.
	27	Monte Carlo Techniques	Los Angeles
February	13	Monte Carlo Techniques	Wash., D. C.
	16, 17, 18	PERT, CPM, PERT/Cost	Wash., D. C.
	18, 19	Time Series Analysis	Los Angeles
	24, 25	Linear Programming	Los Angeles
	24, 25	Resource Allocation	Wash., D. C.
March	8, 9, 10, 11	Power Systems	Los Angeles
	16, 17	Linear Programming	Wash., D. C.
	16, 17	Resource Allocation	Los Angeles

## Linear Programming for Decision Makers

This is a two day management seminar for business executives. It is designed to familiarize them with the principles and major application areas of linear programming, a management science technique widely used in business to solve problems with great numbers of variables. Linear programming is the tool often used to "maximize" or "optimize" in problems such as that of determining the best size and number of delivery trucks to cover a given territory; for determining product mix or feed blends; establishing inventory levels; in make-or-buy decisions; production planning; site selection and in minimizing waste in trimming stock. The seminar covers concepts, case studies, applications and model building. A grasp of basic algebra is required.

### LECTURER

Milton L. Godfrey, Director, Applied Sciences Division, C-E-I-R, Inc.

### FEE

Tuition and all course materials: \$125.00

### SCHEDULE

Washington, D.C. . . . . November 24, 25  
Philadelphia . . . . . December 8, 9  
Los Angeles . . . . . February 24, 25  
Washington, D.C. . . . . March 16, 17

## Monte Carlo Techniques

A one day seminar for industrial systems analysts and operations research practitioners in which a distinguished mathematician discusses both the theory of simulation by computer and its application as a management tool. The seminar covers generation of random numbers, variance reducing procedures, special programming languages for use in simulation, and examples of computer simulation. The benefits of simulation are discussed, as are cost and other considerations involved in the choice between this method and an analytic solution. The lecturer is the author of fundamental research papers on the application of statistical design techniques to experimentation and with simulation and Monte Carlo studies on high speed digital computers.

### LECTURER

Dr. Jack Moshman, Vice President — Professional Services, and Director Statistical Sciences Division, C-E-I-R, Inc.

### FEE

Tuition and all course materials: \$85.00

### SCHEDULE

Los Angeles . . . . . January 27  
Washington, D.C. . . . . February 13

## Resource Allocation & Multi-Project Scheduling

This two day management seminar describes a recently developed computer system for corporate project scheduling and control. In addition to monitoring project status from the perspective of time and/or cost (as in the more familiar PERT and Critical Path Method techniques) this approach is concerned with the essential factor in a planning effort: matching existing resources to one or more jobs. From this realistic foundation, the method can be used to implement comprehensive network planning and scheduling, and efficient use of corporate resources. The seminar is designed for technical managers and administrators, and specialists in project planning efforts.

### LECTURERS

William C. Geoghan, C-E-I-R Technical Education Services Director.

George Fisher, Chief Staff Consultant, Engineering Services, E. I. DuPont de Nemours & Company, Inc.

### FEE

Tuition and all course materials: \$125.00

### SCHEDULE

Los Angeles . . . . . December 15, 16  
Washington, D.C. . . . . February 24, 25  
Los Angeles . . . . . March 16, 17

## PERT, PERT/Cost & Critical Path Methods

This seminar combines two complimentary courses which may be taken either separately or together. The first unit is devoted to a fundamental exposure to the PERT and CPM network project planning techniques. The second unit, presented on the second and third days of the seminar, is devoted to PERT/Cost and covers principles of the technique, new Department of Defense and National Aeronautics and Space Administration (NASA) procedures, application procedures, system management, system installation, and supplementary uses of the technique. Workshop sessions are held on all three days of the seminar. Attendance at the first unit, or some familiarity with networking techniques, is a prerequisite for the two day PERT/Cost unit. Designed for project managers, project and cost engineers, estimators and others concerned with project management.

### LECTURERS

Raymond P. Wenig, C-E-I-R Manager of Applied Management Sciences.

Frank Newman, C-E-I-R Management Science Analyst.

### FEE

Tuition and all course materials:

\$100 first day only  
\$135 second and third days  
\$135 all three days

### SCHEDULE

Los Angeles . . . . . December 8, 9, 10  
Washington, D.C. . . . . December 15, 16, 17  
Washington, D.C. . . . . February 16, 17, 18

## Power Systems Network Analysis

A four day seminar in which digital load flow simulation techniques and short circuit analyses are explored at a level suited for electric utility engineers and consultants whose duties require familiarity with up-to-date computer methods. Each participant attends lecture and discussion periods and workshop sessions in which he employs a digital computer program to formulate typical load flow and short circuit analysis problems. Participants solve typical problems on an IBM 7090/4 computer at a C-E-I-R, Inc., computer center. The seminar provides working knowledge of digital power systems network analysis and improves understanding of the capability of various computers for electric utility engineering work.

### LECTURER

Charles W. King, C-E-I-R Manager of Electric Utility Services.

### FEE

Tuition, course materials and computer time:

\$175.00

### SCHEDULE

Washington, D.C. . . . . Nov. 30 to Dec. 3  
Los Angeles . . . . . March 8, 9, 10, 11

## Time Series Analysis In Business Forecasting

A two day technical seminar on techniques of time series analysis and application of this computer technique to forecasting, planning and control. Lecture and discussion periods cover basic problems encountered in analyzing time series data; types of models and procedures used to isolate and measure the basic components (with particular reference to Census Method II, National Bureau of Economic Research Additive Seasonal Adjustment Program), and environmental, cost and statistical criteria in designing computer applications. Intended for data processing executives seeking improved computer analysis of historical data, and staff specialists who need to understand the logic and applications of Time Series Analysis.

### LECTURER

George W. Taylor, C-E-I-R economist and forecasting systems specialist.

### GUEST SPEAKER

Dr. Jack Moshman, Vice President — Professional Services, and Director Statistical Sciences Division, C-E-I-R, Inc.

### FEE

Tuition and all course material: \$125.00

### SCHEDULE

Washington, D.C. . . . . January 12, 13  
Los Angeles . . . . . February 18, 19



In-Plant

## Seminars

Education programs tailored to an organization's individual needs, and presented at the time and place of its choice, offer several unique advantages. Although the reduction in time and expenses over attendance at out-of-town seminars is worth considering, so, too, are the opportunities presented by such special classes.

An entire management team may, for example, be trained as a group in management science techniques — with uniform exposure, in the context of the organization's own operations, and through a curriculum drawn up to its specifications. Division personnel who will report through a computerized corporate system may be trained in its operation together and under corporate auspices. Development of a new corporate system may be preceded by a training program that provides the affected personnel with the grasp of the technique they need in order to contribute to its optimum implementation.

The courses outlined on the following pages are typical of the great number of special education programs the Institute for Advanced Technology is prepared to develop for your organization.



## Forecasting

A one day management seminar prepared primarily as an orientation course for those who will have to work closely with computer-based forecasting procedures. Some knowledge of statistics is prerequisite to full understanding of the subject matter: components of time series, autocorrelation, forecast error, forecasting as a simple extrapolation by moving averages, exponential smoothing, time series analysis and other forecasting methods, and forecasting as part of an operating system.

## CPM, PERT, PERT/Cost

Decisions to explore, implement, or expand use of networking techniques in an organization carry with them a requirement for training. Often such training is best handled in a course developed especially for the individual organization's personnel. Training by C-E-I-R's working professionals is authoritative, and carries with it the benefit of broad experience in network construction, information collection and dissemination concepts, and choice of computer programs. The level, the length, and the subject matter of training in networking techniques are developed to suit the need of the individual organization.

## Systems Design

This course presents the approaches to and techniques of systems analysis and design through lectures and workshop sessions. Specific case studies of systems design in government and industry are covered. Short systems design problems are presented for solution during workshop sessions and the course concludes with major systems design problems being solved by three to five man team efforts. Emphasis will be on creative and imaginative design techniques.

## Operations Research

The course is designed to provide the system designer with an awareness of the nature of scientific analysis in a number of subject areas, and an understanding of the methodology employed. Various mathematical techniques developed will be described in detail in order to indicate the power and limitations of such tools. Many case studies from industry and government will be covered to present the difficulties and advantages involved in the implementation and control of these techniques. The purpose of the course is to prepare the systems designer to recognize areas in his work which could profit by operations research, and to provide a basis for further investigation.

## Accounting & Management

This 40-hour course is designed to provide an understanding of the practices of management and the basic elements involved. It provides an understanding of the new discipline of managerial accounting as opposed to the more traditional financial accounting and presents an approach to the merger of the two functions of managing and accounting, including an understanding of the informational needs of the manager and shows how to determine the accounting means to satisfy these needs.

## Hardware

This course provides the systems designer with the major types of equipment available today and acquaints him with the most basic engineering problems and trade-offs involved in computer and peripheral equipment design. It presents the basic facts required and procedures used to evaluate hardware devices for specific applications and applies these techniques to the detailed study of three representative computer systems.

## FORTRAN for Engineers

Training in the FORTRAN computer programming language on company premises is an excellent way for companies to quickly and economically reap the benefits of having more of their engineers trained in solving problems with the electronic computer. Training in FORTRAN II requires 36 hours of classroom time, which can be scheduled to suit the individual company's requirements. Instruction covers the language's variables, subscripts, expressions, control statements, arithmetic statements, input/output instructions, sub-routines, functions, and the debugging feature. Instruction in FORTRAN IV can be provided as an optional feature.

## Programming & Software

This course has been designed primarily for the systems designer with no prior programming experience. The systems designer must have an understanding of the problems of programming and a respect for the contribution that skillful, intelligent programming can make to computer applications. The course removes the mystery of programming by providing each student with an opportunity to program a few simple routines.

In addition to the study of basic programming skills and concepts, the course will introduce the student to current developments in the programming field such as special problem-oriented compilers, list processing, and heuristic programming.



## Management Clinics

Half day sessions devoted to a general introduction to the applications potential of management science techniques are presented without charge by the regional centers of C-E-I-R, Inc., in Boston, Los Angeles, New York, San Francisco and Washington, D.C. These "Monday Morning Management Clinics" are open to interested representatives of business, industry and government. Further information about these sessions, their content, and dates of scheduled presentations may be obtained by calling the C-E-I-R Center nearest you (see back cover).

## Why an IAT Seminar?

There are various sources for the type of training available through the C-E-I-R Institute for Advanced Technology seminar program. Among these, the IAT program is distinguished by its unique combination of faculty and teaching format.

IAT instructors are drawn primarily from the Institute's parent organization, C-E-I-R, Inc. These men are experienced professionals who bring to these intermittent teaching assignments not only a sound academic background, but a singular combination of practical outlook attained through application of their skills in real, competitive programs, and the up-to-date technical knowledge expected of representatives of a pre-eminent consulting and data processing organization.

The teaching format is designed to provide the uniformity and continuity often lacking in seminars which offer merely a parade of experts — often differing in terminology, overlapping in subject, and mutually contradictory. Designed as a learning experience, each seminar presents lectures, discussion periods, and, where applicable, workshops — all bound together by a cohesive and consistent viewpoint.

This, the singular combination of teacher/practitioner with a unified presentation geared primarily toward a true learning experience, is the distinguishing feature of the Institute for Advanced Technology.

## Program Information

(Tear out and mail to: Information Department,  
C-E-I-R Institute for Advanced Technology,  
1200 Jefferson Davis Highway, Arlington,  
Virginia 22202)

### SEMINAR REGISTRATION:

☐ Reserve \_\_\_\_\_ places for:

Course Title: \_\_\_\_\_

Place: \_\_\_\_\_ Date: \_\_\_\_\_

☐ Bill company at address below.

☐ Check Enclosed (make out to C-E-I-R, Inc.)

### COURSE INFORMATION (give address below):

☐ Send further information about these scheduled seminars:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

☐ Send further information about the in-plant training program.

☐ Send further information about the Management Clinic program.

NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

FIRM NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_  
PHONE \_\_\_\_\_

## **Regional IAT Representatives**

### **BOSTON**

C. A. Zera  
C-E-I-R, Inc.  
186 Alewife Brook Parkway  
Cambridge, Massachusetts  
Telephone: 491-3050

### **NEW YORK**

Peter Genereaux  
C-E-I-R, Inc.  
1180 Avenue of the Americas  
New York, New York  
Telephone: JU 2-6640

### **SAN FRANCISCO**

Jack Lohrey  
C-E-I-R, Inc.  
100 Bush Street  
San Francisco, California  
Telephone: EX 7-1205

### **LOS ANGELES**

Ray Wakeman  
C-E-I-R, Inc.  
9171 Wilshire Boulevard  
Beverly Hills, California  
Telephone: CR 3-0810

### **WASHINGTON**

J. E. Porter  
C-E-I-R, Inc.  
1200 Jefferson Davis Highway  
Arlington, Virginia  
Telephone: OT 4-6377